



Standard and Expansion Module catalog.

Information about Raptor www.raptor-digital.eu

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Expansion module catalog

Raptor Standard Module catalog.

(Modules already installed within each Raptor.)

Group 0: Standard functionality for each basic Raptor

000 Up to 500 Runways and 250 trains may be entered unto the Raptor administration

Raptor is capable of controlling any size of layout with any number of trains automatically and manually simultaneously. The number of turnouts editable for each turnout-street with each runway is practical unlimited. The user has a free choice of naming blocks and trains up to five additional characters. Administration is also easy to change turnout and Hp0/Hp1 home signal numbers for each runway. Toggle runways/blocks between in-service or out-of-order easily to aid layout track maintenance, etc. All changed data settings are permanently stored, batteries are NOT required.

000 Automatic learn mode for entering the layout into the Raptor administration

Raptor is supplied standard with an UNIQUE automatic TRACK-LEARN-MODE! Just drive one train over the layout manually, while setting the turnouts and home signals, and Raptor will learn all runways, turnout-streets, stop inputs and junction crossings automatically! Entering *any* layout, of *any* size with *any* number of trains, newly into Raptor through the automatic Track Learn Mode should not take more than one or two hours!

000 Build-in Automatic Train Drive with autonomously working train route planner

There is no need to make any settings for new trains on the layout at all. New trains put on the layout merge automatically with the other train movements. The build-in extremely advanced train route planner lets automatically drive all trains over the entire layout immediately including the switching of all turnouts and signals into the right position. With FLAWLESS AUTOMATIC control handling at stations and junction crossings/intersections. Therefore provides the Raptor TRAIN ROUTE PLANNER full automatic train drive, for ALL trains in a very unpredictable, entertaining and spectacular manner. Including automatic DETECTION of trains DELAYS and RE-ROUTING of all other trains. Overview of all train locations with TRAIN NUMBER ID, including those at hidden stations, on the LCD display.

000 STOP inputs to halt trains at (virtual) signals without a drive power cut

Home signals(at hidden stations) with decoder and/or relays are NOT required to stop the trains. Trains STOP at (virtual or real) home signals WITHOUT a drive power cut by a signal switch. With stop inputs are HUNDREDS of built-in BRAKE GENERATORS, for weight simulation decoders at signal stop inputs, included.

000 Independent time setting of POWER DURATION for each turnout or signal

Each turnout, signal and accessory may have individual requirements of power duration due to the presents of (servo)motors or heavy non-smooth gliding switches. The power duration for each individual article may be set between 0 seconds to 10 seconds in steps of 0.1 seconds.

000 Flexible use and handling of S88 inputs on the layout.

Only one input connection is needed at each block for facilitating automatic drive. Built-in S88 noise suppression filter for error free input readouts. (Up to 50 meter standard S88 cable!) All input types like rail switches, magnetic reed contacts, contact rail and position detection, etc., may be used intermixed on the layout. S88 modules and individual inputs can all be monitored even during the Automatic Train Drive.

000 Locomotive multi traction control facilities

This offers the facility to team-up several locomotives as a multi traction span under one leading master locomotive and several slave locomotives. It is possible to team-up unto 64 locomotives in *a single* multi traction span while all kinds of different decoder protocols/brands may be used *intermixed* within any span.

000 Luxurious manual control facilities

Individual and independent (cruise) speed settings of each locomotive, with build-in configurable SPEED-LIMITER, through the very luxurious manual locomotive controller including switching up to 24 functions(DCC). Everything is multi-tasking executed, while the user continues to control Raptor on the large and clear LCD 20x4 display on a scratch-free keyboard with durable buttons and turning knob, all dust resistant. All user commands are executed immediately completely without a noticeable delay (including those done through any other Raptor connected on the RBUS network), regardless of the current load of (the main) Raptor.

Raptor Expansion Module catalog.

(Each module to be purchased separately, for each Raptor.)

Group 1: Input drive modules

001 BRAKE inputs to pace-speed at red signals

Normally causes the standard STOP input a train to brake itself based on its own decoder de-accelerating setting. Additional S88 inputs can be used as BRAKE inputs to initiate a brake motion procedure of an oncoming train towards the next home signal on red, from a greater distance. In combination with Module 002 this will also be done for standard (old) locomotive decoders without such a build-in decoder de-acceleration facility. (This input may be combined with other input types like RED and/or ARRIVE inputs.)

011 Additional RED signal inputs

Normally signals return to the red position after the passing train has reached the next STOP or ARRIVAL input. With this S88 input configured as a RED signal input, which may be located closely after each signal, shall cause the signal to return to the red position immediately with a passing train. (This input may be combined with other input types like ARRIVE and/or BRAKE inputs.)

021 Additional ARRIVAL inputs

Normally trains are reported as arrived when reaching the standard STOP inputs. With these additional inputs a train can be reported earlier to free the previous block. This will enhance the number of simultaneously driving trains. (This input may be combined with other input types like RED and/or BRAKE inputs.)

031 Independent EVENT inputs

This input may be configured to run the turnout street list of a (disabled) runway. With this function it is possible to control rail road crossings, turn tables or other auxiliary accessories.

041 INHIBIT inputs

This input may be configured to inhibit Raptor to drive trains over the selected runways. This function has multi purpose applications, such as blocking the driving away of certain trains by setting an external switch.

051 INHIBIT type of contact(Make/Break)

This module may be used to configure an inhibited condition from a closed contact(Make) or open contact(Break).

061 Minimum INHIBIT time

With this module a time can be set where the condition remains inhibit, after the inhibited contact has returned to normal, until the configured time has expired.

071 Shunt signal Auto/Manual control setting(requires 017)

This module configures any shunt signals to follow the home signal position automatically or allow user manual control over the setting of the shunt signal. When a shunt signal is configured manually and the user has switched the shunt signal to the red position then Raptor is inhibited to drive trains away from those blocks. Examples are decoupled (shunt) wagons on the main track, etc, etc.

081 Arrival inputs valid at the end of S88 input signal

With this module is it possible to report a train as arrived in the block after the last wagon has left/passed the ARRIVAL/STOP contact rail.

Group 2: Drive characteristic modules

002 Pull-up/Brake weight settings(also valid for old decoders)

This module allows the changing of decoder (de)acceleration properties without (re)programming the decoders and even during Automatic Train Drive. Also an (old) standard decoder without build-in decoder (de)acceleration ability obtains this facility anyhow but now as a Raptor Pull-up/Brake weight simulation. With this module it is also possible to manually set the brake length of each individual train regardless of the type of locomotive decoder(in case 012 is not applied).

012 Automatic brake regulation per locomotive per (red) signal(requires 001 & 002)

With this module Raptor full-automatically determines the ideal brake characteristic for each train for each signal, each approaching speed and for any distance of encountered BRAKE input. This automatic brake regulation is done during Automatic Train Drive and follows continuously any drift change of all locomotive decoders/motors over time. The user simply puts any (new) trains on the track and Raptor does all the calibrating automatically. (All automatically collected/learned braking data for each train are permanently stored in the Raptor's database.)

022 Speed correction settings per locomotive and per block

With this module, speed corrections may be made for each train individually for each block. To facilitate high speed tracks(i.e. ICE) or lower speed curved tracks, for instance. (Might be used together with module 032.)

032 Block gradient settings

Mountain track and other (bridge) hill gradients may be configured for each block with this module. A proportional speed correction is performed for each passing train. (Might be used together with module 022.)

042 Skip gradient for cruise-control decoders(require 032, enables 122)

With this module may gradient blocks be configured not to perform speed correction for cruise control decoders (which have this type of correction already built into the locomotive decoders).

052 Cruise speed setting backwards independent of forward direction

Some trains have different cruise speed characteristics in forward/backwards directions. Also purposely pull/push train combinations may have a slower cruise speed setting backwards than forward, etc. These different drive direction dependent speed settings are possible with this module.

062 Pace speed setting backwards independent of forward direction

Some locomotives have different pace speed characteristics in forward/backwards directions. This is particular important during the brake to stop motions (with old types of motors/decoders). These different drive direction dependent speed settings are possible with this module.

072 Enable DCC CV "Variable Access" programming

Manual programming of DCC CV values on "Byte" and "Bit" level, while standing on the main track and even during Automatic Train Drive.

082 Enable DCC locomotive function's F13 to F24

Manual setting of DCC functions F13 to F24. (Default setting is disabled to shield the user from unnecessary, hence faulty, function settings for decoders which normally has functions up to F12 only.)

092 Decoder address setting independent of locomotive number

Creates the opportunity for the user to work with, or change to, a convenient locomotive number for an (old style) decoder without having to reprogram the decoder address (on a programming track). Can also be used to keep train settings and (measured brake) information independently stored in the Raptor's database for locomotive decoders with the same decoder address but with different drive characteristics. (A useful facility for club members on the club layout where double addresses often occur.)

102 Low speed setting backwards independent of forward direction

Some trains should have different low speed characteristics in forward/backwards directions. Also purposely pull/push train combinations must have a different low speed setting backwards than forward over turnout streets, for instance.

112 locomotive direction administration(special for c80 decoders)

Old style c80 decoders, and other Motorola-I(old) decoders, cannot be commanded to drive explicitly in forward or backward direction, as is possible with Motorola-II(new) decoders. This module keeps direction administration automatically which is used by modules 052, 062 and 102 to benefit forward/backward speed differences for Motorola-I(old) decoders as well. (Only when the locomotive is lifted from the track by the user and put back the other way then the user should update the direction administration manually here.)

122 Decoder cruise control setting

With this module locomotives may be marked as having cruise control decoders build-in or (old style) non-speed corrective decoders. This setting shall be used by module 042, the manual locomotive controller and other Raptor functionality were applicable.

132 Decoder sound drive away delay

Modern locomotive decoders with sound effects do not always respond immediately upon speed commands when driving away from a stand still. Because the decoder has to finish the sound effect first before it shall respond to any speed command. This may have as a result that the locomotive jumps away with the latest higher speed command, which is *very* unrealistic. With this module a wait-before-drive-away delay time can be made for each locomotive decoder separately to make sure that the sound locomotive shall drive away realistically after it has completely finished the sound startup procedure only.

Group 3: Timing modules

003 Relative clock time table Wayside-station

With this module can waiting periods in stations be made for individual configurable blocks including the number of seconds of waiting and for each individual train after the train arrival in the specified block(s).

013 Random Wayside station settings for city rail(requires 003)

Like module 003 but with the possibility to add a random factor, from 0% to 100%, chance of driving through the block without waiting at all to make city-rail/rail-bus appearances more realistic.

023 Railway clock

Adds the railway clock in hours:minutes which will run during Automatic Train Drive only.

033 Railway clock time table Wayside-station(requires 023)

Like module 003, however waiting time is based on configured hours:minutes setting absolute to the railway clock and configurable departure interval time in minutes instead.

043 Maximum train delay time alarming settings

Standard Raptor shall alarm/inform the user of a possible train delay of a commanded route for each train, in case the train does not arrive at the destination block within a given time. The standard time of alarming to the user is set to 180 seconds. This function enables the user to freely configure a different (smaller) alarm time to suite the size of the layout and/or the length of each individual runway better. (Raptor keeps the route open and reserved for the delayed train, for safety, while other trains are automatically rerouted if possible.)

053 Minimum train delay time alarming settings

Standard shall Raptor alarm/inform the user of a possible train premature/impossible arrival for a train within a given time. The standard time of minimum alarming to the user is set to 4 seconds. This function enables the user to freely configure a different alarm time to suite the length of each individual runway or blocks better.

063 External connection of train delay/arrival output signal

Normally is the alarming done by a text message on the Raptor LCD display only. With this module it is also possible to connect an external light or sound to attend the user of a train delay on its layout by other means.

Group 4: Train restriction and privileged modules

004 Train Block prohibits

Normally let Raptor drive any train over any runway to any block automatically on the layout. This module enables driving restrictions to be set for each individual train to prevent it from driving into blocks where the user does not want them to go. Examples are electrical locomotives with pantograph's which cannot go into (steam/diesel) blocks without upper power wire and/or personal carriage trains from entering oil-refineries, etc, etc.

014 Train Wayside/stop prohibits

Normally may Raptor have the opportunity to halt any train before any red signal into any block depending on the amount of layout traffic. With this module the user is able to set for each individual train to force Raptor to provide a green signal in order that the train never halts in the specified block(s) but always drives through them. Example usage would be for long trains which do not fit certain blocks and/or cargo trains which should never stop in stations, etc, etc.

024 Train Priorities

All trains have normally the same priority level. This means that Raptor does not distinguish between trains when making automatic selections which train should depart first. This module enables the user to set train priorities for any train for any block(s) to force Raptor to select a train for departure, taking the layout situation into account, with the highest priority first. Examples are marking different priorities for intercity trains over local trains and/or long "heavy" cargo trains over smaller goods trains, etc, etc.

034 Train Runway prohibits

Normally lets Raptor drive any train over any runway automatically on the layout to the (runway destination) blocks. This module enables runway driving restrictions to be set for each individual train to prevent it from driving over runways without restricting total block access if other runways are available to drive the train to that destination block. Examples are certain-model trains that derail over certain turnouts coming from a certain "corner" and/or prevent a short coupled train, like an ICE, to drive over runways with "zigzagging" turnout streets, etc, etc.

044 Train Runway prohibits per drive direction(requires 034)

Module 034 normally allows that runway prohibits are valid for both train driving directions. This module 044 enables the user to add a runway prohibit for a specific driving forward or backward direction only. With the above derailment example it is possible that a train derails over a turnout street in backward direction only, while a forward drive would not pose any problems.

Group 5: Train function control modules

005 Automatic locomotive decoder functions control(klaxon etc.) per S88 input

Since Raptor always exactly knows where each train is located on the layout, it's possible with this module to individually control automatic locomotive decoder functions at certain block locations. Any sequence of locomotive function numbers may be set On or Off when passing STOP-, BRAKE-, ARRIVAL and RED S88 inputs or before a train departure. Examples are klaxon/steam whistles before tunnels' and/or disabling steam generators while driving in tunnels, etc, etc.

015 Delay time per automatic locomotive decoder function control(requires 005)

With this module it is possible to delay the function action trigger, configured through module 005, with a specified number of seconds after reaching a configured S88 input and/or departure of the train. This enables the user to create whole lists of sounds and effects, for each individual train, on the layout, even on locations where absolutely no S88 input is present at all.

025 Execute (magnetic) articles per locomotive passing

This module enables the user to specify which turnout/signal decoder address outputs are set when passing of the configured train. Examples are light indicator control on external dashboards, indicating which train is at the specified block, and/or controlling external sound players as special effects with rail road crossings, etc, etc.

035 Enable locomotive decoder addresses' usage in turnout street for function support

This module allows locomotive decoder function control in runway turnout streets next to the usual turnout decoder output settings. May be used for instance to control digital crane's and/or digital turntables with locomotive decoders rather than the usual turnout/signal decoders.

045 Enable locomotive decoder addresses' usage in turnout street for speed support

This module allows locomotive decoder speed control in runway turnout streets next to the usual turnout decoder output settings. See module 035 for likewise example applications.

055 Arrival actions(turnout/signal) list

Normally executes Raptor the runway turnout street list before the departure of a train. With this module it's also possible to execute another list after arriving of the train in the runway destination block. Examples are returning (old fashioned) turntables, roll bridges back to their respectively begin points and/or closing locomotive garage doors, etc, etc.

Group 6: Rail specification modules

006 Buffer stations

Normally Raptor drives trains automatically round without ever switching the direction of any train. With this module the user is able to mark certain blocks as end stations where Raptor shall switch the driving direction of the train into the opposite direction, when it has completely reached the end of the block, before driving away again.

016 Combine buffer station with drive-through track(requires 006)

Likewise as module 006, but with an extra distinction configuration of making an end station out of a normal drive through track to support certain train services. Examples are rail-buses to drive backwards to another track while intercity's drive through, etc, etc.

026 Home signal Hp0/Hp1 setting per runway instead of block

Normally Raptor automatically controls the standard home signal red/green position for each block. However, if a train from a normally drive through block needs to drive away into the opposite direction(see module 016) it may be necessary to specify another opposite home signal decoder address of the opposite direction instead.

036 Curve home signal Hp0/Hp2 setting per runway instead of block

Likewise as module 026, however also for curve home signals.

046 Junction block setting per runway

In case the layout forces some runways to cross other blocks, containing opposite home signals, before it is reaching their respective runway destination blocks than this module allows proper junction block crossing configurations here. Examples are bidirectional driving station blocks and/or (automatic) shunt locomotive blocks on the main track, etc, etc.

056 Junction block inverter

Normally a junction block setting per runway only inhibits the runway when the specified (crossing) block is occupied by a train. With this module it's also possible to configure a runway inhibit when a block is free instead. Examples are keeping a minimum number of trains at stations and/or handling of stacked (double) blocks at buffer stations, etc, etc.

066 Manual runway junction administration

Raptor is able to calculate fully automatically all runway junctions by data mining all the runway turnout street lists. However, if pure rail cross intersections are used, it may be necessary to add a consequence runway crossing manually here. It is also possible to manually remove an automatic configured junction in case the layout locally allows this safely.

076 Junction block deadlock prevention settings

With the application of multiple usage of junction block settings per runway(see module 046) then certain layout may cause possible deadlock situations where a number of trains can no longer drive because they are in each others way. This module allows a number of deadlock prevention levels for a configurable amount of runways. Enabling Raptor to forcibly keep automatically at least one driving opportunity free for each given layout situation.

086 Junction block logic formulas

Normally has Raptor a large freedom of selecting an automatic train drive sequence depending on the layout situation and train restrictions. With this module Raptor can be forced to follow precise any user train drive sequence for certain parts of the layout only.

096 Layout/runway settings changeable during Automatic Train Drive

Standard the user is not supposed to change his layout during Automatic Train Drive. (Although the user is always allowed to change S88 inputs, tracks and signal numbers on the layout while driving.) However, for clubs and model train shows it might be necessary to change/add runways, block tracks and turnout streets on the layout during Automatic Train Drive, which is facilitated by this module.

Group 7: Signal specification modules

007 Distant signals Vr0/Vr1

This module allows to install Distant Signals Vr0/Vr1 decoder numbers in each block. Raptor full-automatically controls the right setting of the distant signal according to the runway that leads to the NEXT home signal position, which depends on the planned route, in the NEXT block.

017 Shunt signals Sh0/Sh1

This module allows to install Shunt Signals Sh0/Sh1 decoder numbers in each block. Raptor full-automatically controls the right setting of the shunt signal according to the LOCAL home signal (Hp0/Hp1/Hp2) position in the SAME block.

027 Hp1 green delay time

Each signal shall normally become green immediately after all turnouts of the belonging runway has been switched into the right position. Depending on the users drive away scenario it's possible with this module to delay the green moment of the signal a configurable number of seconds after the turnout street is ready. Example usage would be for turntables and/or roll bridges, etc, etc.

037 Driver green reaction to Home Signal Hp1

Normally shall a train drive away immediately after the power duration green time has passed. For a more realistic drive away scenario it's possible with this module to delay the train a configurable number of seconds after the signal has become green.

047 Curved runway setting

With this module are runways configurable as curved runways to facilitate Hp2 signals and/or low driving speed over the turnouts. The Raptor's automatic train route finder will also be configured to select runways preferably with non-curved turnout positions(all green), even in case Hp2 signal are not configured.

057 Curve home signal Hp0/Hp2 per block(requires 047)

This module allows to install Curved Signals Hp0/Hp2 decoder numbers in each block. Raptor full-automatically controls the right setting of the curved signal according to the executed runway turnout street following this signal. The correct signal driver can be selected to facilitate the required sequence control order with any brand of Hp2 home signal manufacturer.

067 Drivers low-speed reaction to yellow curved Hp2 signals

Normally shall a train pass each home/curved signal with its own individual cruise speed. With this module the train de-accelerate to its configured low speed when approaching and passing the specified Hp2 curved signals here.

077 Drivers low-speed reaction to yellow distant Vr0 signal

Each train shall pass each home/curved signal with its own individual cruise speed, regardless of the position of the distant signal displaying the position of the next home signal on the route. With this module the train de-accelerate to the configured low speed when passing a Vr0 distant signal.

087 Distant Curved Signals Vr2

This module allows to install Distant Curved Signals Vr0/Vr2 decoder numbers in each block. Raptor full-automatically controls the right setting of the distant signal according to the runway that leads to the NEXT home curved signal position, which depends on the planned route, in the NEXT block.

097 Nominal signal idle position

Normally a signal is always failsafe red when the current block, with its home signal at the end, is free/empty. With this module each block home signal may be configured to become green anyhow when a next block has become free, regardless if a train is present in the current block. This will realistically simulate traditional block signaling system handling.

107 Home signal Hp0/Hp1 deactivations

Normally Raptor expects a home signal at the end of each block on the entire layout. With this module, blocks may be configured to be without a home signal at all, forcing Raptor to calculate routes for trains in such a way that they do not have to stop at the deactivated/removed home signal but drive through to a next already reserved block.

Group 8: Auxiliary input modules

008 Turnout feedback input handling

Raptor automatic control has eliminated troublesome driving since Raptor does not need reliable home signal relays anymore to stop or start the trains. With the build-in S88 noise filters the train track and trace have become extremely reliable as well. Normally only the turnouts, especially LGB on outside garden layouts, may cause a reliability issue in case they do not switch properly, causing the oncoming trains to derail or take the wrong track. With this module Raptor does verify the correct position of the commanded turnouts through installed turnout feedback position switches(especially available for LGB turnouts!) connected to S88 decoders. This detects and compensates faulty turnouts to make Automatic Train Drive completely without accidents!

018 Switch delay time of articles in turnout street

Normally is each article of an engaging runway executed immediately. With this module it's possible to configure an execution delay time for each article. Example usage would be for turntables and/or digital cranes, etc, etc.

028 Stop input and/or Arrival input deactivations

Raptor expects a stop/arrival input in each block on the entire layout. With this module, blocks may be configured to be without stop and/or arrival inputs at all, forcing Raptor to track and trace trains with inputs located further down the calculated route. This module might be used(in conjunction with 107) on large demonstration layouts to quickly deactivate malfunctioning input rail connections/detection circuits without changing the layout registration.

038 Arrival input configurable per runway(requires 021)

Trains are reported earlier as arrived when reaching the additional Arrival inputs per destination block. With this module arrival inputs may be individual configured on different S88 connections per runway rather than per block. This enables under certain (complex) layout conditions even more efficient arrival train handling.

048 External Turnout Post manual control(requires 009)

Normally are Turnout Posts controlled by the user through the Raptor's keyboard. With this module the user may connect his own (designed) dash-/switchboard(s) on additional S88 decoder(s) to control the layout part(s) under manual turnout post configuration externally. (See module 009) This implies the possibility for several users to control layout parts simultaneously while having one controlling Raptor only!

058 Synchronize turnouts according external on-off lever switches(requires 048)

A turnout is switched normally to the other position when the user is pressing the button which is (auto)configured for this turnout within the user configured manual post. With this module the user may use lever-switches on the switchboard rather than push-buttons to control the manual post externally.

068 External Signal Post manual control(requires 009)

Normally are Signal Posts controlled by the user through making Departure/Destination selections on the LCD display with the Raptor's keyboard. With this module the user may connect his own (designed) dash-/switchboard(s), with Begin- and End block buttons, on additional S88 decoder(s) to control the layout part(s) under manual signal post configurations externally. (See module 009 and last remark at module 048)

078 Temporary disable external manual post through external input(requires 048)

An external enabled manual post may normally be disabled on the Raptor's keyboard only. With this module it's possible to create an extra switch on the external dashboard which allows a temporary Raptor Automatic Train Drive control of the manual post as long the switch is active. Example usage would be on large show demonstration layouts if a user needs to walk away from his post without blocking the trains which were under his control.

088 External Halt button(requires 031)

Normally the Automatic Train Drive is halted by pressing the red Halt button on the Raptor's keyboard(s) or through the occurrence of a booster overload. With this module an external S88 connection may be configured as a central external ring closed circuit to halt all the trains by multiple installed push buttons.

098 Manual adjusting S88 noise input filtering plus inverter settings

Default S88 noise input filter configurations on the Raptor may be fine tuned (heavier/lighter) through this module. It's also possible to invert the trigger function of each individual S88 connection.

108 Enable check last S88 input module(a bus fault detector)

To reach the highest level of S88 cable fault detection this module may be used in combination with a simultaneously grounded and open S88 connection on the last S88 decoder. One S88 connection should be connected to the "ground" permanently and one S88 connection should be left "open" permanently for this detection to work. The Automatic Train Drive shall disengage and Halt immediately all trains as soon as previous described condition no longer exist.

118 Turnout contra feedback input handling(requires 008)

Normally only one side of the turnouts needs to be verified for correct switching. With this module Raptor does also verify the correct *contra* position of the commanded turnouts through installed turnout *contra* feedback position switches(again especially available for LGB turnouts!) connected to S88 decoders. Both the normal turnout feedback from Module 008 and this contra turnout feedback must be in agreement to confirm a correctly switched turnout. Any turnout may be individually configured of having one normal single feedback input or this double configured normal plus contra feedback input.

Group 9: Manual control posts modules

009 Configure manual post settings and control

The Raptor Automatic Train Drive is prevented from departing trains from Departure configured blocks and command trains to Destination configured blocks under enabled manual posts. The manual post may be configured and enabled/disabled with this module. It implies the manual turnout post control through the Raptor's keyboard(s) and attached computer signaling display(s).

019 Manual Train Guidance

Normally the Raptor Automatic Train Drive determines where the train will be sent over the layout. With this module it's possible to select a train and select destinations blocks for this train manually throughout the other automatically driving trains over the entire layout.

029 Control manual signal post(requires 009)

Manual Signal Posts are controlled by the user through making Departure/Destination selections on the LCD display with the Raptor's keyboard. This selection may span multiple blocks and runways to force Raptor to calculate a (valid/free) route between departure and destination blocks.

039 Manual post control without junction supervisor(requires 009)

Normally are manual post departure actions by the user supervised by Raptor. Implicating that Raptor refuses the users action if the corresponding turnout street crossings are currently occupied by other driving trains. This module enables the user to disable this supervisor function thus taking full responsibility but also complete freedom in controlling manual post departures at will.

049 Permanent manual post control settings(requires 009)

Enabled manual posts are normally disabled when the Raptor system is restarted. This module make enabled manual posts on a permanent basis until the manual post is disabled again by the user personally rather than a Raptor restart.

059 Mix Automatic Drive with (internal) manual post(s) (requires 009)

The Raptor Automatic Train Drive is prevented from departing trains from Departure configured blocks and command trains to Destination configured blocks under engaged manual posts. With this module it's possible individually per block to configure if the Automatic Train Drive may autonomously decide to depart- and/or destine a train respectively from or to a manual post controlled blocks anyhow. Allowing fine tuning of manual post configurations in any layout situation.

069 Manual post turnout overwrite control(requires 009)

Normally the user switching of a turnout belonging to a manual post is supervised by Raptor. The user command will be refused in case a train might be driving over the turnout. With this module the user can disable this supervisor function thus taking full responsibility but also gain complete freedom in controlling manual post turnouts at will.

079 External manual post error output indicator(requires 009)

Any user manual post action that is refused by Raptor (because junctions, turnouts and/or blocks are occupied) is accompanied by a LCD display message explaining the refusal. With this module one output per manual post may be configured to indicate a refusal externally (by a red light, for instance).

Group 10: Train accounting and exception modules

010 Mileage hours accounting per locomotive

This module automatically keeps record of the number of hours each locomotive has actually driven. Hence, the time that each locomotive is standing still before red signals is not taken into account.

020 Combine locomotive mileage hours with a maintenance schedule(requires 010)

With this module a maintenance alarm may be configured for each locomotive in combination with the mileage hours accounting. In case the number of mileage hours exceeds the maximum number configured here, then Raptor notifies the user that the concerning locomotive is in need of maintenance.

030 Deploy trains during Automatic Train Drive

For large (show) layouts it is convenient if trains could be deployed during the Automatic Train Drive. This module facilitates the adding or removing of trains on the layout under all driving circumstances.

040 Historic train passing accounting

This module automatically keeps record of the number of trains that has passed each block on the layout. Through the sorting order of the display it is also possible to backtrack certain train historic movements to aid any investigation of layout (technical) faults, like malfunctioning turnouts and/or faulty wiring.

050 Limit maximum number simultaneous driving trains

Normally Raptor tries to drive as much trains simultaneously during Automatic Train Drive as possible to achieve the highest level of viewer spectacle. However, some circumstances might require to restrict the maximum number of simultaneously driving trains, like booster restrictions and/or maintenance drives, etc, etc.

060 Switch articles Before and After Automatic Train Drive

This module makes it convenient to switch appliances like fountains, amusement park movements and alike "on" during Automatic Train Drive and "off" when the layout is halted.

070 After-switch pause (magnetic) article settings

Some turnout power supplies, for example, require a power recovery time before the next (heavy) turnout may be switched. This time of pause may be configured for each turnout individually with this module.

080 Highest priority for locomotive under manual speed/function controller

In case a user wants to control the speed of a train while Raptor directs the train automatically over the layout, then with this module the train receives the highest priority anywhere in order that the user does not need to wait longer than necessary.

090 Disable (magnetic) article inhibits at booster overloads

Normally around booster overload incidents Raptor shall repeat any turnout/signal commands during that event to make sure that the decoder reception and power duration of the turnout/signal is ensured. In case all the (decoder) turnouts/signals have been installed on a separate booster, from which no locomotive track is powered, than this facility may be disabled for a normalized sequence of turnout/signal command execution, during track booster overloads, for more efficiency.

100 <Reserved>

110 <Reserved>

120 Apply Brake learning assistance with low-speeds

In the beginning of full-automatically determination of the ideal brake characteristics for new trains, to each signal for each arriving speed and for each distance of BRAKE input, some Raptor tryouts may cause prolonged time of trains driving at pace speed. This module aids the brake learning process by advancing the train to low speed after a while to save time without compromising the learning process in any way.

130 Inter-raptor layout data communication over RBUS

This module allows layout and train data from the Raptor's database to be accessed through the RBUS channels.

140 Enable S88 data over RBUS

This module causes the Raptor to receive modified S88 contacts data over the RBUS channels.

150 <Reserved>

160 <Reserved>

170 <Reserved>

180 Swap DCC (magnetic) articles output

Change red outputs into green and vice versa to facilitate Lenz LS100 decoders with swapped usage of the '+' and '-' outputs on those decoders.

190 Generate Motorola signal timing according to genuine 6021

Full backwards compatibility to facilitate any mandatory 6021 control requirements.

200 MOT signals generation 6015/6017 compatible with DCC signals(Spoor I)

Compatible signal generation to facilitate 6015/6017 boosters to support DCC.

210 Apply Motorola (magnetic) article switch signal repeater

Enhance Motorola switch decoders functionally under extremely heavy electrical noise and disturbance conditions.